ABSTRACT

A method and system to determine brain stiffness is disclosed. A probe to measure tissue water content is inserted through an aperture (burr hole) in the cranium into brain tissue. The probe has two electrically separated plate conductors with a dielectric which forms a capacitor plane. One conductor has a surface mount resistor to allow exact impedance matching to the core of a coaxial cable. The other conductor attaches electrically to the shield of the coaxial cable. The probe is stabilized in the brain tissue through a plastic ventriculostomy bolt which has been secured by screw tapping into the cranium. The coaxial cable connects to a spectrum analyzer. Brain water content and blood congestion alter the resonant frequency of the probe, allowing a realtime readout of apparent tissue water content. By monitoring the momentary shift in center resonant frequency or, alternatively, the standing wave ratio slightly off resonant frequency, a beat-to-beat pulsatile waveform is derived relating to the perfusion of the brain. A strain gauge intracranial pressure sensor (ICP) is separately affixed through the bolt and adjacent to the water content probe. By comparing the phase angle or lag time difference between the pressure tracing and the perfusion tracing, a realtime measurement of organ stiffness or compliance is derived.